

527 Rec'd PCT/PTC 20 NOV 2000

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(Rev. 12-29-99)

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTORNEY'S DOCKET NUMBER

**TRANSMITTAL LETTER TO THE UNITED STATES  
DESIGNATED/ELECTED OFFICE (DO/EO/US)  
CONCERNING A FILING UNDER 35 U.S.C. 371**

006895-010

U.S. APPLICATION NO. (If known, see 37 C.F.R. 1.5)

Unassigned

09/700743

INTERNATIONAL APPLICATION NO.  
PCT/CZ98/00025INTERNATIONAL FILING DATE  
25 May 1998PRIORITY DATE CLAIMED  
25 May 1998

TITLE OF INVENTION

A DEVICE FOR PERPENDICULAR STRATIFICATION OF PLANARY FIBROUS SHAPES

APPLICANT(S) FOR DO/EO/US

Oldřich JIRSÁK, Jaroslav HANUŠ, Václav KOTEK, Filip SANETRŇÍK, and Radko KRČMA

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and the PCT Articles 22 and 39(1).
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
  - a. ☒ is transmitted herewith (required only if not transmitted by the International Bureau).
  - b. ☒ has been transmitted by the International Bureau.
  - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US)
6. ☐ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
  - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
  - b. ☐ have been transmitted by the International Bureau.
  - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
  - d. ☒ have not been made and will not be made.
8. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).


Items 11. to 16. below concern other document(s) or information included:

11. ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☒ A FIRST preliminary amendment.
 ☐ A SECOND or SUBSEQUENT preliminary amendment.
14. ☐ A substitute specification.
15. ☐ A change of power of attorney and/or address letter.
16. ☒ Other items or information:

PCT INTERNATIONAL SEARCH REPORT

PCT INTERNATIONAL PRELIMINARY EXAMINATION REPORT

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U.S. APPLICATION NO. (If known, see 37 C.F.R. 1.50) <b>Unassigned</b> <span style="font-size: 1.5em; margin-left: 50px;">09/700743</span>		INTERNATIONAL APPLICATION NO. <b>D04H 11/04</b>		ATTORNEY'S DOCKET NUMBER <b>006895-010</b>	
17. <input checked="" type="checkbox"/> The following fees are submitted:				<b>CALCULATIONS</b>	PTO USE ONLY
<b>Basic National Fee (37 CFR 1.492(a)(1)-(5)):</b>  Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO ..... \$1,000.00 (960)  International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO ..... \$860.00 (970)  International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO ..... \$710.00 (958)  International preliminary examination fee paid to USPTO (37 CFR 1.482) but all claims did not satisfy provisions of PCT Article 33(1)-(4) ..... \$690.00 (956)  International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(1)-(4) ..... \$100.00 (962)					
<b>ENTER APPROPRIATE BASIC FEE AMOUNT =</b>					
Surcharge of \$130.00 (154) for furnishing the oath or declaration later than months from the earliest claimed priority date (37 CFR 1.492(e)). 20 <input type="checkbox"/> 30 <input type="checkbox"/>				\$	
Claims	Number Filed	Number Extra	Rate		
Total Claims	3 -20 =	0	X\$18.00 (966)	\$	
Independent Claims	1 -3 =	0	X\$80.00 (964)	\$	
Multiple dependent claim(s) (if applicable)			+ \$270.00 (968)	\$	
<b>TOTAL OF ABOVE CALCULATIONS =</b>				\$	860.00
Reduction for 1/2 for filing by small entity, if applicable. Verified Small Entity statement must also be filed. (Note 37 CFR 1.9, 1.27, 1.28).				\$	430.00
<b>SUBTOTAL =</b>				\$	430.00
Processing fee of \$130.00 (156) for furnishing the English translation later than months from the earliest claimed priority date (37 CFR 1.492(f)). 20 <input type="checkbox"/> 30 <input type="checkbox"/>				\$	
<b>TOTAL NATIONAL FEE =</b>				\$	430.00
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 (581) per property +				\$	
<b>TOTAL FEES ENCLOSED =</b>				\$	430.00
				<b>Amount to be:</b>	
				refunded	\$
				<b>charged</b>	\$
<p>a. <input checked="" type="checkbox"/> A check in the amount of \$ <u>430.00</u> to cover the above fees is enclosed.</p> <p>b. <input type="checkbox"/> Please charge my Deposit Account No. <u>02-4800</u> in the amount of \$ _____ to cover the above fees. A duplicate copy of this sheet is enclosed.</p> <p>c. <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. <u>02-4800</u>. A duplicate copy of this sheet is enclosed.</p> <p><b>NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.</b></p> <p>SEND ALL CORRESPONDENCE TO:</p> <p>George A. Hovanec, Jr. BURNS, DOANE, SWECKER &amp; MATHIS, L.L.P. P.O. Box 1404 Alexandria, Virginia 22313-1404 (703) 836-6620</p> <p style="text-align: right; margin-top: 20px;">         SIGNATURE         William C. Rowland        NAME         30,888        REGISTRATION NUMBER     </p> <p>November 20, 2000</p>					

09/700743, 11/20/00

09/700743  
529 Rec'd PCT/PTC 20 NOV 2000

Patent

Attorney's Docket No. 006895-010

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Patent Application of	)	
	)	
Oldřich JIRSÁK et al.	)	Group Art Unit: Unassigned
	)	
Application No.: Unassigned	)	Examiner: Unassigned
	)	
Filed: November 20, 2000	)	
	)	
For: A DEVICE FOR PERPENDICULAR	)	
STRATIFICATION OF PLANARY	)	
FIBROUS SHAPES	)	
	)	

**PRELIMINARY AMENDMENT**

Assistant Commissioner for Patents  
Washington, D.C. 20231

Sir:

Prior to the examination of the above-identified patent application, please  
amend the application, please amend the application as follows:

**IN THE CLAIMS:**

Please amend claims 3 as follows:

Claim 3, line 1, change "claims 1 and 2" to --claim 1--.

**REMARKS**

If the Examiner has any questions concerning the amendment or the above-identified

application in general, the Examiner is invited to contact the undersigned so as to expedite prosecution.

Respectfully submitted,

BURNS, DOANE, SWECKER & MATHIS, L.L.P.

By: William C. Rowland  
William C. Rowland  
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Date: November 20, 2000

A Device for Perpendicular Stratification of Planary Fibrous Shapes

The scope of the patent is a device for production of voluminous shapes by perpendicular stratification of planary fibrous shapes, above all of fibrous web  
5 from a carding machine.

Description of the Prior Art

For the production of webbing from a web as obtained from machines with  
10 carding effect substantially three basic principles are known and used, based on parallel, cross or perpendicular web stratification. The method of the fibrous layer preparation and the related fibre orientation in the layer has a deciding importance for the product properties. In the case of voluminous products, which are exposed in their application to a single, repeated or longlasting stress, the  
15 best properties are obtained by preparing the fibrous layer by perpendicular stratification of the web. Under most variable conditions such products best retain their functional properties, especially as fillers or thermal insulants.

Several types of equipment working on rotational or vibration principle are known in the production of a fibrous layer composed of fibres laid substantially  
20 perpendicularly to the product plane.

Perpendicular laying devices on rotational principle form the web by means of various types of rotating elements such as gear wheels, cylinders with pins or rotating disks with specially shaped indents between which the web is fed. A merit of such systems protected e.g. by CZ AO 273997 is their high performance  
25 and a wide range of perpendicularly laid produced webbing. A limitation is their limited possibility of controlling the fibre position at various specific densities of the web, and a heterogenous structure of product surface. A deviation of fibre orientation from a perpendicular orientation to the layer surface makes the compressing resistance of the product decline. Rotating elements of the laying  
30 device such as e.g. a system of wires, formed disks or indentations produce a row-like structure, connected with an irregular density of fibre distribution in the product area.

A certain progress in this trend was brought in a device according to CZ AO 269 300 and the related Patent Application PV 1819-92. The web fed to the device from upside is formed in plaits by a vibrating fly comb and individual plaits are pressed to a fibrous layer built up between a conveyor belt and a grid by a synchronously vibrating batten.

30 from upside is formed in plaits by a vibrating fly comb and individual plaits are pressed to a fibrous layer built up between a conveyor belt and a grid by a synchronously vibrating batten.

The driving mechanism of the shaping elements which must exert a highly demanding and accurate motion, is solved according to PV 1819-92 by a four-joint assembly, featuring two groups of tie-rods driving the two vibrating elements - the fly comb and the batten. The light functional vibrating elements proper are directly connected to assemblies converting a circular motion to a reciprocating motion. A high stress of the assemblies converting the circular motion to a reciprocating motion generates shock forces and causes a vibration of working elements (fly comb, batten). Both shafts are interconnected by sets of three gear-wheels. Though the mechanism provides for a synchronous drive of both working elements, it permits, however, owing to a complicated setup and a considerable mass of the equipment, even in a carefully balanced condition an oscillation frequency merely up to 600 cycles per minute. Such capacity is far from satisfying the needs of modern carding machines, with which the laying device is incorporated into the production line. Said heavy mass of individual components according to this concept leads in a continuous uninterrupted operation to an accelerated wear of the gear-wheels, pins and bearings and consequently to a shorter life expectancy of the machine. With continuing operation time the noise level is gradually increased and the product becomes less uniform. Another consequence thereof is an uneven shaping of individual web plaits with an increasing frequency.

The vibrating elements must be coupled together with the prime mover by a number of joints, the distance from each other depending on the machine frequency required and on the bending rigidity of working elements. Any frequency increase requires therefore an increase in the number of joints and consequently of gear-wheels or of the mass of vibrating elements. Both said possibilities result in an increased overall mass of moving parts of the machine and make any further increase of the working frequency impossible.

#### Nature of the invention

The limitations mentioned above are remedied by a device for perpendicular stratification of planary fibrous shapes with two synchronously vibrating elements according to the invention. The vibrating elements are connected with the driving

member indirectly by the intermediary of one or two robust shafts, rigidly fitted in bearings in a rigid machine framework. The vibrating elements are connected with the shaft(s) directly or by means of a set of flexible joints in sliding fitting.

The flexible joints can consist of flat steel springs with a width-to-thickness ration  
5 higher than 10, but also of tie rods, having sliding fitting and flexible knuckle joints. The flexible joints with sliding fitting permit to convert a circular motion of the driving prime mover and of the massive shaft into a linear reciprocating motion of vibrating elements.

The mechanism can comprise a driving shaft with two crank assemblies fitted  
10 with a phase shift between each other. The shafts are driven by the driving mechanism synchronously so that they make a reciprocating motion around their longitudinal axes. Owing to its large diameter and high rigidity, the shaft (possibly a tube) transmitting a reciprocating motion, does not vibrate under the influence of the forces transmitted onto it by the driving mechanism. Thus the shaft  
15 transmits to the working element a motion which is evenly distributed along its whole width without generating any unwanted vibration. The merit of the device is in that it prevents any vibration of working elements even at the necessary high operating speed owing to the connection of said elements with rigidly seated shafts by means of a set of resilient joints, own mass of which is substantially  
20 smaller as compared with known transmission members. Such device is able to work at a frequency of 2000 cycles per minute. This is a frequency, permitting to process fibrous web with a speed corresponding to the speed of modern carding machines.

25 Other advantages of the device according to the invention are a high life expectancy at a minimum maintenance demand, a minimum of rotating parts, on which any fibres or web can be wound-on, an easy setting of back position of vibrating elements when adjusting the machine for processing various types of goods directly on the shaft tie-rods, a possibility of easy changing the amplitude  
30 of vibrating elements directly on the driving mechanism.

Setting of the phase shift for the vibration motion of the functional members is necessary for a safe web doffing from the doffer comb working edge. This



enables an accurate plait shaping, which is a must for obtaining a smooth surface and an even product density.

#### Survey of figures in the drawings

5

Fig. 1 shows schematically a device for perpendicular stratification of planary fibrous shapes with one single shaft.

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Fig. 2 shows schematically a device for perpendicular stratification of planary fibrous shapes with two shafts and one vibrating element in sliding fitting and a second vibrating element in rigid fitting.

Fig. 2a shows schematically a driving mechanism.

Fig. 3 shows schematically a device for perependicular stratification of planary fibrous shapes with two shafts and vibrating elements in sliding fitting.

15

#### Examples of embodiment

##### Example 1

20

A device shown in Fig. 1 serves for processing of a fibrous layer, e.g. fibrous web coming from a carding machine. It consists of two vibrating elements 1 and 2 for perpendicular stratification of web. Said elements 1 and 2 are connected over a shaft 4 and connecting rod 10 with knuckle joint 11 and a driving mechanism 3.

25

The shaft 4 makes a rotating and reciprocating motion along its longitudinal axis. The shaft 4 is a robust tube having an outer diameter 701 mm and is rigidly fitted in bearings in a rigid framework of the machine. The vibrating element 1 is rigidly connected with the shaft 4, the element 2 is joined by means of tie-rods 7 with sliding fitting and flexible knuckle joints.

30

The vibrating element 2 takes over the fibrous web by means of a set of needles from the element 1 and shapes a plait, which is then pressed to the fibrous layer on the conveyor belt.

The device is suitable for the production of a fibrous layer in which the fibres are oriented predominantly perpendicular towards the fabric plane.

##### Example 2

A device shown in Fig. 2 consists of two vibrating elements 1 and 2 as in Fig. 1. The element 1 is connected with a driving mechanism 3 over a shaft 4 and the element 2 over a shaft 5 by means of tie-rods 7 with sliding fitting and flexible knuckle joints. The driving mechanism 3 shown in Fig. 2a consists of a driving shaft 8 with two crank shafts 9. The crank shafts are set up to allow advanced phase movement of one of vibrating elements.

In comparison with Example 1, due to the advanced phase movement of vibrating element 2, the processed fiber layer is better taken off the vibrating element 1. Therefore the folds are more regular and the fabric of smooth surface is produced..

### Example 3

A device in Fig. 3 consists of the same elements as in Example 2, both the vibrating elements 1 and 2 are linked with shafts 4 and 5 by means of tie-rods 6 and 7 with sliding fitting and flexible knuckle joints.

The advantage of the device is the straight-lined movement of both vibrating elements 1 and 2 which does not cause air turbulence and vibrations of the fed in carded web. It leads to improved regularity of final fabric.

### Example 4

A device as in Example 3, the flexible knuckle joints 6 and 7 are replaced with steel springs. Due to this the mass of links and dynamic loading of driving mechanism is reduced and the life of device improved.

### Utilization of the device

The device for perpendicular stratification of planary fibrous shapes is utilizable namely in the textile industry.

**Patent claims****5 What we claim is:**

- 10 1. A device for perpendicular stratification of planary fibrous shapes, above all a fibrous web, with two elements making synchronous and reciprocating motions and connected with a driving mechanism, characterized in that the elements (1,2) exerting a reciprocating motion are connected with the driving mechanism (3) indirectly over at least one robust shaft (4) rigidly fitted in bearings in a rigid framework of the machine, while one element (1) is coupled to the shaft (4) rigidly or over flexible joints (6), and a second element (2) is coupled by means of flexible joints (7) with the same shaft or with another shaft (5).
- 15 2. A device according to Claim 1, characterized in that the driving mechanism (3) consists of one driving shaft (8) with two crank assemblies (9) arranged with a phase shift to each other.
- 20 3. A device according to Claims 1 and 2 characterized in that the flexible joints (6) and (7) consist of flat steel springs with width-to thickness ratio more than 10.

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International Bureau



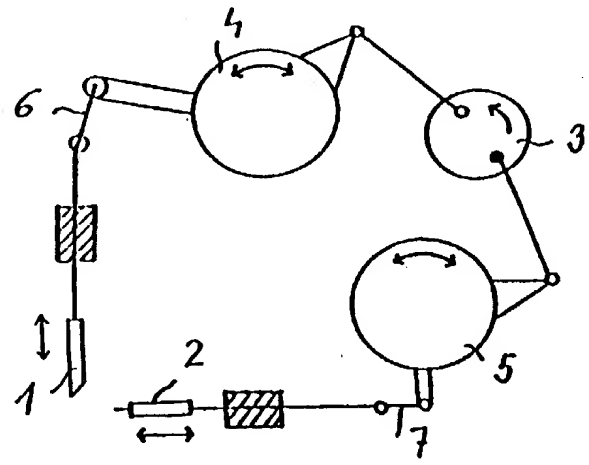
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(72) Inventors; and			
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(54) Title: A DEVICE FOR PERPENDICULAR STRATIFICATION OF PLANARY FIBROUS SHAPES

(57) Abstract

A device for perpendicular stratification of planary fibrous shapes, above all of fibrous web, comprising two synchronously moving elements, connected with the driving mechanism according to the invention consists in that the reciprocating moving elements (1, 2) are connected with their driving mechanism (3) indirectly by the intermediary of at least one robust shaft (4) rigidly fitted in bearings in a rigid framework of the machine, while one element (1) is connected with the shaft (4) rigidly or over flexible joints (6), and a second element (2) is coupled by means of flexible joints (7) with the same shaft or with another shaft. The driving mechanism (3) can consist of one driving shaft (8) with two crank assemblies (9) arranged with a phase shift to each other. The flexible joints (6 and 7) consist of flat steel springs with a width-to-thickness ratio more than 10.



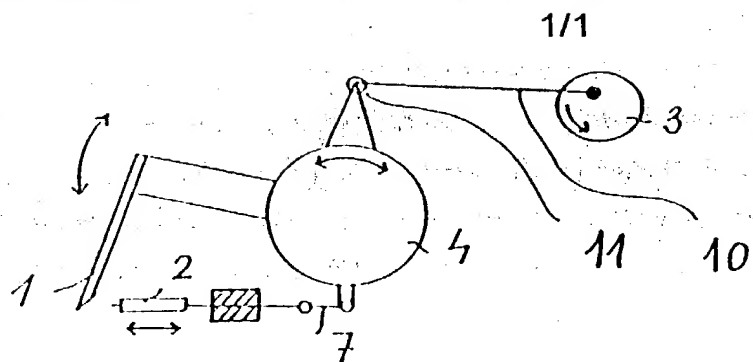


Fig. 1

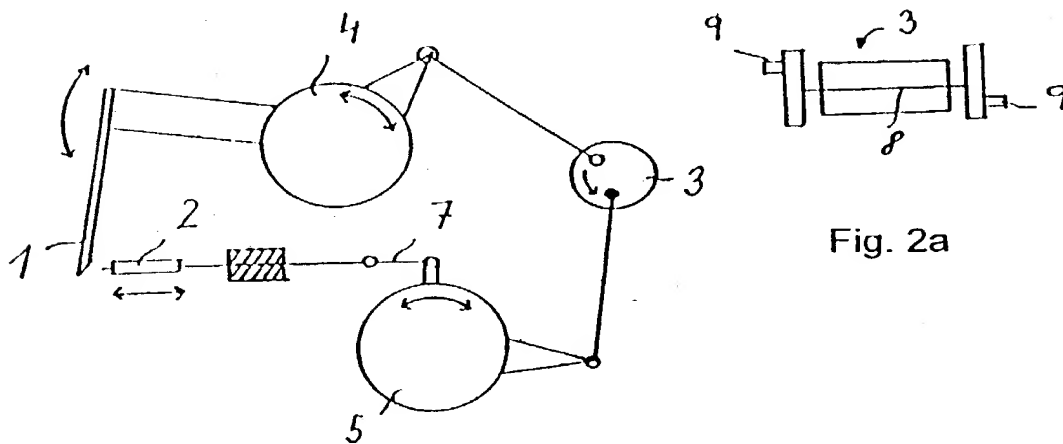


Fig. 2a

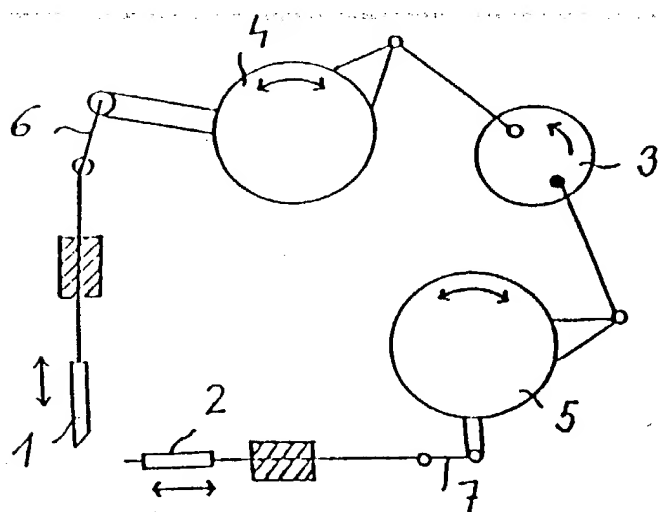


Fig. 3



**COMBINED DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY (CONT'D)**  
(Includes Reference to Provisional and PCT International Applications)

Attorney's Docket No.

006895-010

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) or PCT international application(s) designating the United States of America that is/are listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in that/those prior application(s) in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose to the Office all information known to me to be material to the patentability as defined in Title 37, Code of Federal Regulations §1.56, which became available between the filing date of the prior application(s) and the national or PCT international filing date of this application:

PRIOR U.S. APPLICATIONS OR PCT INTERNATIONAL APPLICATIONS DESIGNATING THE U.S. FOR BENEFIT UNDER 35 U.S.C. §120:

U.S. APPLICATIONS		STATUS (check one)		
U.S. APPLICATION NUMBER	U.S. FILING DATE	PATENTED	PENDING	ABANDONED
PCT APPLICATIONS DESIGNATING THE U.S.				
PCT APPLICATION NO.	PCT FILING DATE	U.S. APPLICATION NUMBERS ASSIGNED (if any)		
PCT/CZ98/00025	25 May 1998		X	

I hereby appoint the following attorneys and agent(s) to prosecute said application and to transact all business in the Patent and Trademark Office connected therewith and to file, prosecute and to transact all business in connection with international applications directed to said invention:

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

COMBINED DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY (CONT'D) (Includes Reference to Provisional and PCT International Applications)		Attorney's Docket No. 006895-010
FULL NAME OF SOLE OR FIRST INVENTOR Oldřich JIRSAK	SIGNATURE <i>Jirsa</i>	DATE October 30, 2000
RESIDENCE Liberec, Czech Republic	CITIZENSHIP Czech	
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FULL NAME OF SIXTH JOINT INVENTOR, IF ANY	SIGNATURE	DATE
RESIDENCE	CITIZENSHIP	
POST OFFICE ADDRESS		
FULL NAME OF SEVENTH JOINT INVENTOR, IF ANY	SIGNATURE	DATE
RESIDENCE	CITIZENSHIP	
POST OFFICE ADDRESS		
FULL NAME OF EIGHTH JOINT INVENTOR, IF ANY	SIGNATURE	DATE
RESIDENCE	CITIZENSHIP	
POST OFFICE ADDRESS		